

WHAT IS CLAIMED IS:

1. A coating method comprising coating polyurethane powder coating materials on a metal substrate, wherein the polyurethane powder coating materials comprise

- A) 3 - 25% by weight of a polyurea;
- B) 35 - 75% by weight of at least one amorphous or semicrystalline polyester having a hydroxyl number of from 5 to 250 mg KOH/g and a melting point of from 50 to 130°C;
- C) 5 - 30% by weight of at least one crosslinker based on one or more of blocked polyisocyanates, blocked isocyanurates and uretdiones having a functionality of at least 2; and
- D) 0.5 - 50% by weight of auxiliaries and additives,

where component C) has 0.5 to 1.2 NCO groups available per OH group of component B).

2. The method according to Claim 1, further comprising
homogenizing the polyurethane powder coating materials in a melt;
cooling the melt to form a solid; and
pulverizing the solid to form a powder; wherein
the coating comprises depositing the powder on the metal substrate.

3. The method according to Claim 2, wherein the powder consists of particles each having a particle size of less than 100 μm .

4. The method according to Claim 1, further comprising curing the polyurethane powder coating materials on the metal substrate.

5. The method according to Claim 1, wherein the coating comprises electrostatically spraying the polyurethane powder coating materials on the metal substrate.

6. The method according to Claim 1, wherein the coating comprises fluidized-bed sintering of the polyurethane powder coating materials on the metal substrate with or without electrostatic assistance.

7. The method according to Claim 1, wherein the polyurea A) is produced from monomers comprising
at least one isocyanate having a functionality of at least two; and
at least one amine having a functionality of at least two,
where an NCO/NH₂ ratio of the at least one isocyanate and the at least one amine is from 0.9 – 1.1:1.

8. The method according to Claim 7, wherein the at least one isocyanate having a functionality of at least two comprises an isocyanurate.

9. The method according to Claim 7, wherein the at least one isocyanate having a functionality of at least two is selected from the group consisting of isophorone diisocyanate, hexamethylene diisocyanate and 4,4'-dicyclohexylmethane diisocyanate.

10. The method according to Claim 7, wherein the at least one amine having a functionality of at least two is selected from the group consisting of aliphatic diamines, cycloaliphatic diamines, aromatic diamines and polyamines having 5-18 carbon atoms.

11. The method according to Claim 7, wherein the at least one amine having a functionality of at least two comprises isophoronediamine.

12. The method according to Claim 1, wherein the component B) comprises an amorphous polyester.

13. The method according to Claim 12, wherein the amorphous polyester has a functionality of from 2.0 to 5.0, an OH number of from 5 to 250 mg KOH/g, a viscosity at 160°C of < 60,000 mPa·s, and a melting point of from 50°C to 130°C.

14. The method according to Claim 1, wherein the component B) comprises a semicrystalline polyester.

15. The method according to Claim 14, wherein the semicrystalline polyester has a functionality of from 2.0 to 4.0, an OH number of from 5 to 250 mg KOH/g, a melting point of from 50°C to 130°C, and a glass transition temperature of < -10°C.

16. The method according to Claim 1, wherein the crosslinker C) is produced from starting components including at least one diisocyanate selected from the group consisting of isophorone diisocyanate, hexamethylene diisocyanate and 4,4'-dicyclohexylmethane diisocyanate.

17. The method according to Claim 1, wherein the crosslinker C) is blocked with at least one member of the group consisting of caprolactam, triazoles, oximes and pyrazoles.

18. The method according to Claim 1, wherein the auxiliaries and additives D) comprise at least one member of the group consisting of leveling agents, pigments, fillers, dyes, catalysts, light stabilizers, heat stabilizers, antioxidants and effect additives.

19. A coated metal substrate comprising a metal substrate and a coating on the metal substrate, wherein the coating has a matt appearance and is produced by a coating process from polyurethane powder coating materials comprising

- A) 3 - 25% by weight of a polyurea;
 - B) 35 - 75% by weight of at least one amorphous or semicrystalline polyester having a hydroxyl number of from 5 to 250 mg KOH/g and a melting point of from 50 to 130°C;
 - C) 5 - 30% by weight of at least one crosslinker based on one or more of blocked polyisocyanates, blocked isocyanurates and uretdiones having a functionality of at least 2; and
 - D) 0.5 - 50% by weight of auxiliaries and additives,
- where component C) has 0.5 to 1.2 NCO groups available per OH group of component B).

20. The coated metal substrate according to Claim 19, wherein the coated metal substrate has, at an angle of 60°, a gloss level in a range of from 1 to 70.